What Is Claimed Is:

1. An electrically tunable vertical cavity surface emitting laser comprising:

a laterally-extending base comprising an optically-transparent semi-conductor material;

a first laterally-extending mirror comprising alternating layers of (i) said optically-transparent semiconductor material, and (ii) air;

a second laterally-extending mirror comprising alternating layers of (i) said optically-transparent semiconductor material, and (ii) air;

a laterally-extending layer of multiple quantum well material defining a laterally-extending P-I-N junction therein;

said first laterally extending mirror being fixedly mounted to said laterally extending base;

said laterally-extending layer of multiple quantum well material being fixedly mounted to said first laterally extending mirror;

said second laterally extending mirror being movably mounted to said laterally-extending layer of multiple quantum well material such that an air gap extends between said first laterally-extending mirror and said layer of multiple quantum well material;

a first electrode electrically connected to said first laterally-extending mirror; and

a second electrode electrically connected to said base;

whereby when a voltage difference is applied across said first and second electrodes, the electrically tunable, vertical cavity, surface emitting laser will change its lasing wavelength in response to the electrostatically induced movement of said first and second laterally-extending mirrors relative to one another.

2. An electrically tunable vertical cavity surface emitting laser according to claim 1 wherein said second laterally-extending mirror is mounted to said laterally-extending multiple quantum well material with a cantilever construction.

3. An electrically tunable vertical cavity surface emitting laser according to claim 1 wherein said second laterally-extending mirror is mounted to said laterally-extending multiple quantum well material with a trampoline construction.

4. An electrically tunable vertical cavity surface emitting laser comprising:

a laterally-extending base comprising an optically-transparent semiconductor material;

a first laterally-extending mirror comprising alternating layers of (i) said optically-transparent semiconductor material, and (ii) AlO_x;

a second laterally-extending mirror comprising alternating layers of (i) said optically-transparent semiconductor material, and (ii) AlO_x;

a laterally-extending layer of GaAlAs or GaInAs based multiple quantum well material defining a laterially-extending P-I-N junction therein;

said first laterally-extending mirror being fixedly mounted to said laterally-extending base;

said laterally-extending layer of GaAlAs or GaInAs based multiple quantum well material being fixedly mounted to said first laterally-extending mirror;

said second laterally-extending mirror being movably mounted to said laterally-extending layer such that an air gap extends between said laterally-extending layer and said second laterally-extending mirror;

a first electrode electrically connected to said first laterally-extending mirror; and

a second electrode electrically connected to said base;

whereby when a voltage difference is applied across said first and second electrodes, the electrically tunable vertical cavity surface omitting laser will change its lasing wavelength in response to the electrostatically induced movement of said first and second laterally-extending mirrors relative to one another.

5. An electrically tunable vertical cavity surface emitting laser according to claim 4 wherein said second laterally-extending mirror is mounted to

said laterally-extending quantum well material with a cantilever construction.

6. An electrically tunable vertical cavity surface emitting laser according to claim 4 wherein said second laterally-extending mirror is mounted to said laterally-extending quantum well material with a trampoline construction.

7. An electrically tunable vertical cavity surface emitting laser according to claim 4 wherein said base comprises GaAs, and said first and second mirrors comprise alternating layers of (i) a material selected from the group consisting GaAs; GaAlAs; and $Ga_{1-y}Al_yAs/Ga_{1-z}Al_zAs/Ga_{1-y}Al_yAs$ where $y > 0.5$ and where $Z < 0.7$, and (ii) AlO_x .

8. An electrically tunable optical filter comprising:

a laterally-extending base comprising an optically-transparent GaAs material;

a first laterally-extending mirror comprising alternating layers of (i) a material selected from the group consisting of GaAs; GaAlAs; and $Ga_{1-y}Al_yAs/Ga_{1-z}Al_zAs/Ga_{1-y}Al_yAs$ where $y > 0.5$ and $Z < 0.7$, and (ii) $Al0_x$;

a second laterally-extending mirror comprising alternating layers of (i) a material selected from the group consisting of GaAs; GaAlAs; and

$Ga_{1-y}Al_yAs/Ga_{1-z}Al_zAs/Ga_{1-y}Al_yAs$ where $y > 0.5$ and $Z < 0.7$, and (ii) AlO_x;

said first laterally-extending mirror being fixedly mounted to said laterally-extending base;

said second laterally-extending mirror being movably mounted to said first laterally-extending mirror such that an air gap extends between said first laterally-extending mirror and said second laterally-extending mirror;

a first electrode electrically connected to said first laterally-extending mirror; and

a second electrode electrically connected to said second laterally-extending mirror;

whereby when a voltage difference is applied across said first and second electrodes, the electrically tunable optical filter will change its spectral response.

9. A method for making an electrically tunable Fabry-Perot structure, said method comprising the steps of:

(1) providing a GaAs substrate having two epitaxially grown distributed Bragg reflectors separated by a sacrificial layer on one surface thereof;

(2) lithographically defining craters on said substrate;

(3) using a photoresist as a masking layer, etching the distributed Bragg reflectors until the

sidewalls of the bottom distributed Bragg reflector are exposed;

(4) lithographically defining cantilever structures in said distributed Bragg reflector/sacrificial layer structure and metal electrodes at the base of said crater and on the top distributed Bragg reflector;

(5) depositing metal electrodes on the lithographically defined locations;

(6) lithographically defining a protection layer for use in the selective removal of portions of the distributed Bragg reflector layers; and

(7) removing selected portions of the distributed Bragg reflectors and the sacrificial layer by etching,

whereby the top distributed Bragg reflector forms a cantilever relative to the bottom distributed Bragg reflector and the outer tips of the distributed Bragg reflectors each define a series of semiconductor fingers separated by air gaps.

10. A method according to claim 9 wherein said selected portions of said distributed Bragg reflectors are oxidized prior to the final etching step such that only said selected portion of said sacrificial layer is removed by said final etching step.

11. A method according to claim 9 wherein said sacrificial layer is AlAs and said distributed Bragg reflectors comprise alternating layers of (1) GaAs and

(2) a material selected from the group consisting of AlAs and GaAlAs.

12. A method according to claim 10 wherein said sacrificial layer is AlAs and said distributed Bragg reflectors comprise alternating layers of (1) GaAs and (2) a material selected from the group consisting of AlAs and GaAlAs.

13. A method according to claim 10 wherein said sacrificial layer is $Ga_{1-a}Al_aAs$ where $a < 0.1$, and wherein said distributed Bragg reflectors comprise alternating layers of (1) $Ga_{1-x}Al_xAs$ where $x > 0.96$ and (2) a material selected from the group consisting of $Ga_{1-z}Al_zAs$ and $Ga_{1-y}Al_yAs/Ga_{1-z}Al_zAs/Ga_{1-y}Al_yAs$.

14. A method according to claim 13 wherein $0.7 > Z > 0$ and $y > 0.5$.

15. A method according to claim 13 wherein said oxidation comprises exposing the edges said $Ga_{1-x}Al_xAs$ layers to water at a temperature between about 360°C and 450°C in an atmosphere selected from the group consisting of nitrogen and helium.

16. A method according to claim 9 wherein said sacrificial layer is GaAs and said distributed Bragg reflectors comprise alternating layers of (1) GaAs and (2) a material selected from the group consisting of AlAs and GaAlAs.

17. A method according to claim 10 wherein said sacrificial layer is GaAs and said distributed Bragg reflectors comprise alternating layers of (1) GaAs and (2) a material selected from the group consisting of AlAs and GaAlAs.